

Each reference to the page description is encoded in a printed tag. The tag identifies the unique page on which it appears, and thereby indirectly identifies the page description. The tag also identifies its own position on the page. Characteristics of the tags are described in more detail below.

Tags are printed in infrared-absorptive ink on any substrate which is infrared-reflective, such as ordinary paper. Near-infrared wavelengths are invisible to the human eye but are easily sensed by a solid-state image sensor with an appropriate filter.

A tag is sensed by an area image sensor in the netpage pen, and the tag data is transmitted to the netpage system via the nearest netpage printer. The pen is wireless and communicates with the netpage printer via a short-range radio link. Tags are sufficiently small and densely arranged that the pen can reliably image at least one tag even on a single click on the page. It is important that the pen recognize the page ID and position on every interaction with the page, since the interaction is stateless. Tags are error-correctably encoded to make them partially tolerant to surface damage.

The netpage page server maintains a unique page instance for each printed netpage, allowing it to maintain a distinct set of user-supplied values for input fields in the page description for each printed netpage.

The relationship between the page description, the page instance, and the printed netpage is shown in Figure 4. The printed netpage may be part of a printed netpage document 45. The page instance is associated with both the netpage printer which printed it and, if known, the netpage user who requested it.

As shown in Figure 4, one or more netpages may also be associated with a physical object such as a product item, for example when printed onto the product item's label, packaging, or actual surface.

20 **1.2 CODED DATA ON SURFACES USING NETPAGE TAGS**

Various netpage coding schemes and patterns are described in the present applicants' co-pending US application USSN 09/575154 entitled "Identity-Coded Surface with Reference Points", filed 23 May 2000; co-pending US application USSN 10/120441 entitled "Cyclic Position Codes", filed 12 April 2002; co-pending US application USSN 10/309358 entitled "Rotationally Symmetric Tags", filed 4 December 2002; 25 co-pending US Application USSN 10/409864 entitled "Orientation-Indicating Cyclic Position Codes", filed 9 April 2003; and co-pending US Application USSN _____ entitled "Symmetric Tags", filed 4 March 2004 (Docket number NPTQ37).
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1.2.1 **Tag Data Content**

In a preferred form, each tag identifies the region in which it appears, and the location of that tag within the region. A tag may also contain flags which relate to the region as a whole or to the tag. One or more flag bits may, for example, signal a tag sensing device to provide feedback indicative of a function associated with the immediate area of the tag, without the sensing device having to refer to a description of the region. A netpage pen may, for example, illuminate an "active area" LED when in the zone of a hyperlink.